

REMARKS

The rejection of Claims 33-57 under 35 U.S.C. § 103(a) as unpatentable over EP0930339 (Ninomiya I) in view of EP0892006 (Ninomiya II), is respectfully traversed.

The present invention relates to a process for producing an ethylene-vinyl alcohol copolymer (EVOH) resin with good thermal stability and a low production cost, a process for producing resin pellets, and resin pellets obtained by the process.

As described in the specification under "Background of the Invention," beginning at page 1, line 10, forming EVOH resin pellets by extrusion has been problematical in the prior art, leading to many attempts to address the problems. However, these attempted solutions have been problematical as well, for reasons described. Many of the problems in the prior art concern water. It is generally known that the amount of water has been adjusted by either immersing the EVOH resin in a water bath or drying the EVOH resin. However, these methods result in a non-uniform amount of water inside and outside the resultant EVOH resin pellet, or the residue of catalyst is not effectively removed from the EVOH resin, thus requiring a relatively large washing bath. When EVOH resin pellets have had their water amount adjusted in this way, and then subjected to melt molding, motor torque and torque variation at the time of melt molding is increased, and products obtained by molding the pellets are deficient, as described in the specification at page 1, line 28 through page 2, line 28.

The present invention successfully addresses the above-discussed problems of the prior art. The present invention allows for the use of a relatively smaller amount of washing, and motor torque and torque variation at the time of melt molding is comparatively smaller, resulting in excellent extruding stability. Moreover, a film so melt-molded has a relatively smaller amount of catalyst residue, fewer gel and hard spots, and less coloring.

All of the presently-claimed methods are characterized by supplying or removing water from an extruder already containing melted EVOH resin (resin) in a temperature range of 70 to 170°C and discharging the resin with a water content of 5 to 40% by weight. Three embodiments thereof are the subject of independent Claims 33, 37 and 39, respectively.

Thus, Claim 33 requires removing the residue of saponification catalyst contained at the time of production of the resin with washing water. The benefits of this embodiment are described in the specification at page 16, line 27 through page 17, line 3, and demonstrated in the specification in Table 6, for Examples 5-9, compared to Comparative Examples 3-5, and described in the specification therein at page 44, lines 5-12. The data show that simply immersing in washing water is insufficient.

Claim 37 requires removing water, either in liquid or vapor form. The benefits of this embodiment are demonstrated by comparing Examples 11-14 with Comparative Examples 7-9, as described in the specification beginning at page 47, line 24, and as shown in Tables 11 and 12 at page 49.

Claim 39 requires keeping the entire water content of a pellet at the time of feeding the resin into the extruder at 0.5 to 70 weight %, and the rate of a surface water of the pellet of the resin at less than 10 weight %. The benefits of this embodiment are demonstrated in the specification by comparing Examples 22 and 23 with Comparative Example 16, as described in the specification beginning at page 57, line 9, and shown in Tables 18-20, at pages 60 and 61, especially Table 20, and as described in the specification at page 61, lines 3-18. As described therein, advantages of this embodiment include the ability to feed materials into an extruder without bridging in the hopper therein; since the amount of surface water of the pellet is smaller, no water vapor is generated at the lower part of the hopper, and thus the raw material is not melt-attached; and since the raw material pellets are fed into the extruder,

the added amount of acid and/or metal salt is stable, and therefore, thermal stability is not deteriorated.

Applicants also claim EVOH copolymer resin pellets, both in product-by-process format, such as Claim 44, and in functional format, such as Claim 46.

The superiority of the presently-claimed invention is demonstrated by the ample amount of comparative data in the specification, discussed, in part, above, wherein Examples 1-23 are according to the present invention and Comparative Examples 1-16 are not, the results described in the specification at pages 30-61 thereof, and shown in tabular form in Tables 1-20.

Ninomiya I discloses a resin composition comprising an EVOH copolymer and a boron compound, at least one of an acetic acid salt and a phosphoric acid compound, and optionally acetic acid, which composition is described as typically produced by bringing EVOH with a water content of 20-80% by weight into contact with an aqueous solution containing the respective additive components and then subjecting the thus-treated EVOH to a fluidized state drying and then to a stationary state drying (page 1). However, and as conceded by the Examiner, Ninomiya I does not disclose the particular conditions for the processes of the present claims. The Examiner therefore relies on Ninomiya II. However, as discussed below, Ninomiya II does not remedy the deficiencies in Ninomiya I.

Ninomiya II discloses hydrous EVOH pellets having a water content of 5 to 60% by weight and a particular storage elastic modulus, wherein the hydrous pellets may contain various additives, as described (page 1). Ninomiya II describes a process for preparing their pellets, wherein a solution of the EVOH in a mixed solvent of water and an alcohol is extruded in the form of a strand through a nozzle into a coagulating bath comprising water or a mixed solvent of water and an alcohol, the strand after coagulation is cut to porous pellets containing water and the alcohol in large amounts, and the porous pellets are then washed by

contacting with water, and dried to give hydrous pellets (page 2, line 53 through page 3, line 1; page 5, lines 36-39). Ninomiya II discloses further that the water content may be adjusted by mixing EVOH pellets (containing water and methanol) in the production process with water, stirring the resulting mixture and then adjusting the water content by drying (page 5, lines 52-54). Ninomiya II discloses additionally that the hydrous, porous pellets are contacted with water one or more times, whereby impurity elimination and methanol removal are realized and the water content is adjusted, resulting in hydrous pellets containing a large amount of water with a reduced methanol content, and then the pellets are contacted with air or an inert gas or a water-alcohol mixed vapor to thereby adjust the methanol content to a particular range and at the same time adjust the water content to 5 to 60% by weight (page 6, lines 8-18).

The Examiner relies on the disclosure at page 9 and the Examples of Ninomiya II; however, this disclosure is not inconsistent with the above-discussed disclosure in Ninomiya II.

Thus, Ninomiya II neither discloses nor suggests adjusting an amount of water **in the extruder**, and thus the ensuing benefits of removing saponification catalyst residues prior to discharge of the resin from the extruder, obtaining a pellet having uniform distribution of water throughout, and the ability to extrude in a stable manner with less motor torque and torque variation in the extruder.

Since the applied prior art neither discloses nor suggests the novel processes of the present claims, the pellets obtained thereby, and pellets having the same or similar properties to those obtained thereby, are deemed patentable as well.

For all the above reasons, it is respectfully requested that this rejection be withdrawn.

Applicants respectfully call the Examiner's attention to the Information Disclosure Statement (IDS) filed May 19, 2005. The Examiner is respectfully requested to initial the

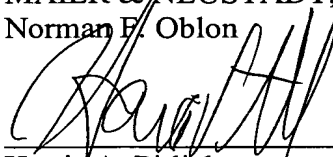
Application No. 10/728,939
Reply to Office Action of April 28, 2005.

Form PTO 1449 submitted therewith, and include a copy thereof with the next Office communication.

All of the presently-pending claims in this application are believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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